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VOLUME 17 JANUARY, 1953 NUMBER 1

"An ignorant man has been defined as one whom
God has packed up and men have not unfolded."
NEWELL DWIGHT HILLIS

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A Conference Session will be held during the 1953 Annual Meeting on dental hygienist educational programs. A committee has been appointed to conduct the Session: Margaret A. Bailey, Evelyn Hannon, Margaret E. Swanson, Gerald D. Timmons, Temple University, *Chairman*.

VOLUME 17 JANUARY, 1953 NUMBER 1

JOURNAL of DENTAL EDUCATION

Contents

Editorial: Good Teaching: What Is It? 5

The American Dental Association Film Library, *Helaine S. Levin* 8

Conference Sessions:

Partial Denture Prosthesis:

Considerations in Oral Rehabilitation, *O. W. Silberhorn*, D.D.S. 10

Discussion, *J. V. Olson*, D.D.S. 22

Periodontal Aspects of Prosthetic Restorations, *D. W. Brown*, D.D.S. 23

Relation of Individual Departments to a Centralized Department of Diagnosis and Treatment:

The Relation of the Departments of Endodontics and Periodontics, *R. G. Kesel*, D.D.S. 28

The Relation of the Department of Roentgenology, *D. T. Waggener*, D.D.S. 31

The Relation of the Department of Crown and Bridge Prosthesis, *D. H. Dock*, D.D.S. 36

Operative Dentistry:

Plastics in the Field of Operative Dentistry: Teaching and Present Status, *H. D. Coy*, D.D.S. 41

Discussion, *E. W. Skinner*, Ph.D. 45

Library Corner, *Josephine P. Hunt* 48

College News 49

Book Announcements 50

Education does not mean teaching people what they do not know. It means teaching them to behave as they do not behave. It is not teaching the youth the shapes of the letters and the tricks of numbers, and then leaving them to turn their arithmetic to roguery, and their literature to lust. It means, on the contrary, training them into the perfect exercise and kingly continence of their bodies and souls. It is a painful, continual, and difficult work to be done by kindness, by watching, by warning, by precept, and by praise; but, above all, by example.

—JOHN RUSKIN

EDITORIAL

Good Teaching: What Is It?[1]

There are two sides, at least, to every question, but in this case it is well in the beginning to think in terms of the positive and negative sides. Following this we may have a look at other requirements of "good teaching," including certain qualifications of the "good teacher."

The Negative Side

1. Reading over material designed for a certain period, either in full or many portions of it, to the student, or what may be worse, telling the story, does not succeed in teaching that student. It must be apparent that teaching is not a matter of imparting information or knowledge—it is something more. Good teaching cannot be mere telling.

2. An outworn method belonging to the field of teaching consists in the assignment of material, then requiring the student to recite upon it or respond to a quiz. This fails of any mental development whatever. Good teaching cannot result from memory work or mere reciting.

3. Laboratories and clinics provide activity, but even these may be outmoded technical procedures which have no use other than to occupy time. Activity without thought as to application has no value in teaching, for, The eye's a better pupil and more willing than the ear.[2] A principal function of teaching in this era consists in the complete coordination of scientific principles and findings with clinical procedures. Therefore, activities must have the special attention of the teacher.

4. Attendance is greatly to be desired by the teacher and is essential on the part of the student, but to have regulations so set up as to make this a demand will not insure good teaching nor good learning on the part of either "teacher or taught." Mere attendance does not mean good teaching.

5. Loyalty is the manifestation of a splendid relation between a teacher and his students, but it is the result of good teaching. There is not much doubt but that the most effective teaching occurs when the student admires or is loyal to his teacher. Like the law of averages, supply and demand, etc., cause and effect or result go together. In the teaching area, loyalty of the student is developed by the teacher through his own ingenuity expressed in his ability, his honor, and all that goes to make up a qualified individual. It is dangerous to attempt to build or develop a personal loyalty—such must go beyond the individual—the teacher must be objective in all that he says or does.

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[1]Suggested by and followed in form of, Geo. O. Taylor: *Church School Guide*, 25, 4; 1950.
[2]*J. Am. Coll. Dent.*, 16, 196; Nov., 1952.

The Positive Side

1. Good guiding is a first requisite and is at once a result and a requirement of good teaching. What more can a teacher do than create within the student a desire to know, then be prepared to show him where to find what he wants? A teacher must know something about his subject—he must be able to qualify in that which he professes. However, it is more important that first things be done first. He must help the student to find out for himself.

The teacher says to the student, "I teach, but you learn." The fact is, the student does both—he teaches himself through the guidance of the teacher as a result of which he learns. But the teaching process goes out beyond these two persons. A college is not a group of buildings with all they contain, and a faculty in which body rests a great amount of knowledge, all together, acting machine-like and turning out a group of graduates annually. Yet at the same time it does consist of all of these, but including the student body. This latter group may easily be proved to be the most important factor in this institution. All of these together create an atmosphere in which both teacher and taught learn, one from the other. It may even be considered that students learn as much from each other as from any other source. At any rate, it is here that the student is started on the right road and from the total environment it is hoped that he may continue on that road. Guiding Is Important.

2. A good aim is the second requisite. It was stated above that the teacher must be objective in all of his work. Therefore the question, "What is the aim of the teacher?" is apropos. Education is in reality a transforming process. Schools are not machines that grind out men equipped for life and with a life-work. Schools are the places where education may be found, but education is a process by which men go and grow from and to.[3,4] The aim of the teacher, then, must be to transform the student, a young man, into a man with some knowledge and a means of knowing how to find whatever more he may want. In an educational survey a few years ago engineers found their chief need to be 75 per cent character, while only 25 per cent was allotted to knowledge. The Aim of the Teacher Is Important.

3. If guiding and aiming are important objectives of the teacher, then there must be a place for planning. Not much can be done without a previously worked out plan. The builder follows the plans previously drawn by the architect, thus avoiding any "hit and miss" strokes.

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[3]See *J. Cal. S. Den. Assn.*, 26, 245; Sept.-Oct., 1950.
[4]See *J. Am. Coll. Den.*, 14, 183; Dec., 1947.

So it must be with the teacher, except that he must be his own architect.

4. Now it follows that the teacher must be an explorer. John Stuart Mill has stated what in reality has become a dictum: "Education is the total culture received by one generation from its predecessor, carried forward to a higher level and turned over to its successor." This being true, each generation will have its own plans, methods, and whatever else may be needed, so that the teacher must advance regularly within each generation else he is outmoded very quickly. Each day, week, month, year, and decade brings new material resulting only too soon in complete change. The teacher must be an explorer in order to keep step with all of this.

5. But, above all, the teacher must live as he teaches. He must be able to do what he says, and with a degree of dexterity. His acts must conform to his principles,[2]

> "For I may misunderstand you and the high advice you give,
> But there's no misunderstanding how you act and how you live."

Hence, it may be possible to realize a two-fold method of education,[5] from the standpoint of the teacher and the student; and also, "the academic function of knowledge and skill,[6] so essential in this day.

In a recent report on "The Improvement of Instruction" by the University of Missouri, the total subject was considered under three heads:[7]

1. The Evaluation of Instruction
2. The Evaluation of Programs for Improving Teaching
3. The Evaluation of the Teacher

This is a most timely report and study. There is too much of value to attempt any excerpts except just one: "Just as the effectiveness of students' learning tends to increase when students have regular and meaningful knowledge of results, so also the effectiveness of teaching may increase as teachers know how the consumers are reacting to their efforts."

With all the changes that have taken place within the profession of dentistry, including teaching, one who has witnessed it all can realize and fully appreciate the present. But we cannot stop with the present, nor feel that the ultimate has been attained—it never will be, else Mill's dictum becomes null and void. There is and must always be room for improvement, even in teaching.

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[5] J. Den. Ed., 13, 130; Mar., 1949.

[6] J. Den. Ed., 13, 4; Nov., 1948.

[7] Judgment in Teaching (Second Annual Conference on the Improvement of Instruction at the University of Missouri). Published by University of Missouri, R.102. Building, T-3, Columbia, Missouri. Free on request.

THE AMERICAN DENTAL ASSOCIATION FILM LIBRARY

HELAINE S. LEVIN,[1] *Chicago*

The American Dental Association Film Library, since its reorganization in 1952, has been primarily concerned with developing its technical film collection in those subjects which are included in the curricula of dental schools.

As a result we now have many new titles covering such subjects as operative dentistry, periodontics, exodontics, denture construction, oral surgery, pulp canal therapy, and oral pathology. All of these technical films, photographed in color, are excellent for teaching purposes and are suitable for undergraduate and postgraduate dental students. What makes many of them valuable as teaching aids is their brevity and the excellent close-up shots of gingival surgery and root canal treatment, surgical implants and cavity preparation. The time element is important since a few points are stressed in a short time, making them easily adaptable for instructional use. The use of patients, plaster models, "before and after" roentgenograms, and animation also add to their visual interest. A well organized film employs these forms and where the film is intended for teaching, usually concludes with a summary.

Several of these technical films have magnetic sound. We refer to those recently introduced by the University of Minnesota School of Dentistry such as, "Correction of Deformity of Jaws" and "Bone Graft and Plating of the Mandible," both reviewed in the November issue and "Toothbrushing for the Periodontal Patient," reviewed in the December issue of the *Journal of the American Dental Association*. Other dental schools may be in the process of producing or have already produced films about which we know nothing. Any information of this kind, therefore, will be very helpful.

We are continually increasing this collection and by the end of 1953 hope to have several films on each topic. Prior to their purchase they are screened by a review committee consisting of general practitioners, specialists in the field covered by the film, and faculty members of dental schools.

In a preliminary meeting arranged in the spring of 1952 by the ADA Film Library staff with the deans and visual representatives of the Chicago dental schools, various criteria for selection of films were discussed and the concensus resulted in the following:

[1]Film Librarian, American Dental Association, which should be of interest to schools and school libraries.

1. Organization—If the film is well organized, there is no superfluous sequences. The film opens with a brief explanation of what is to be shown; it is shown; and then the film concludes with a summary.
2. Content—If the technic illustrated in the film differs from the routine, that does not necessarily imply our rejection of it as a film selection.

   Controversial technics can stimulate thinking and also enlarge the student's perspective. If, however, unacceptable anesthetizing solutions or chemicals are introduced or if the technics demonstrated violate any basic principles of the profession or if commercial advertising is present, these may suffice as reasons for rejection.
3. Presentation—"Before and after" roentgenograms, diagrams, models and patients, vary the visual media and assist in the learning process.

   If the film is silent, titles and explanatory legends are necessary.
4. Photography and Lighting—Good photography will enable the viewer to see all the intra-oral activity very clearly. The more close-ups, the greater the instructional value. Good lighting has an important effect on good visibility.
5. Length of Film—This is an important factor to consider since long films are not as practicable for integration into a teaching course. They may be used as an introduction to the subject or as a review at the conclusion of the subject. Assuming that the content is well covered, a shorter film is therefore more suitable pedagogically.

Not only is the American Dental Association Film Library interested in developing and circulating its film collection but previous surveys and information requests indicate a growing need for the establishment of a Central Film Agency in the dental field. In 1949 the Dental Teaching Aids Committee of the American Association of Dental Schools conducted a survey on the use of motion pictures in the dental curricula, published in volume 26, 1949, of the Proceedings of the Twenty-sixth Annual Meeting of the American Association of Dental Schools. This indicated that many department heads would have used more films if information on their availability had been provided. The deans and visual representatives of the Chicago dental schools also reiterated this point. We are, therefore, trying to establish a center in the Association Film Library for dissemination of visual information. To assist us in this program and to help us determine its direction and scope, current data on the use of audio visual aids, on equipment, production of films, etc., by the dental schools is needed. A questionnaire is now being circulated among the deans and/or coordinators of dental schools to obtain this information. The results of this study will be made available to the Association of Dental Schools and will also be published in the *Journal of the American Dental Association.*

All of our films are available on loan ($2.50) from the American Dental Association Film Library, 222 East Superior Street, Chicago 11, Illinois. For a film listing and for further information, please write to the ADA Film Library.

CONFERENCE SESSIONS[1]

CONTENTS

I. Partial Denture Prosthesis:
1. Considerations in Oral Rehabilitation 10
Discussion 22
2. Periodontal Aspects of Prosthetic Restorations 23

II. Relation of Individual Departments to a Centralized Department of Diagnosis and Treatment:
1. The Relation of the Departments of Endodontics and Periodontics 28
2. The Relation of the Department of Roentgenology 31
3. The Relation of the Department of Crown and Bridge Prosthesis 36

III. Operative Dentistry:
Plastics in the Field of Operative Dentistry: Teaching and Present Status 41
Discussion 45

I. PARTIAL DENTURE PROSTHESIS

1. Considerations in Oral Rehabilitation

O. W. SILBERHORN, D.D.S.,[2] *Chicago*

Problems arising in the dental school clinics, while no different from those arising in the private office, frequently must be handled in a vastly different manner because of the inexperience in technical ability of the student, financial straits of the patient and lack of teaching manpower in many of the dental schools. Obviously it is impossible for the instructor to do a great deal of the technical work required in complicated cases, and, to entrust it to an inexperienced student too often results in failure, discontent on the part of the patient and loss of time to the student.

Most authorities agree that the rehabilitation of the oral cavity is recognized as a most valuable service to mankind. A great deal of effort has been directed to oral rehabilitation, and much extensive work has been accomplished along this line to a degree that it would seem logical to assume it is, or should be, definitely a part of every-day practice. Dental literature pertinent to rehabilitation of the mouth reveals that research workers and clinicians have given much time to the study of fixed and removable artificial restorations which fulfill the biologic, physiologic and mechanical requirements. Studies have been directed

[1]Annual meeting, American Association of Dental Schools, Colorado Springs, March, 1952.
[2]Northwestern University Dental School.

toward diagnostic procedures; toward the prevention of caries and recurrent caries; toward the prevention of periodontal disease; toward traumatic occlusion; toward pathologic involvements; toward functional occlusion, and toward the maintenance of the health, not only of the oral tissues, but of all the associated tissues throughout the entire body. The hope has been, as a result of the above observations, that there would be sufficient evidence showing general improvement of dental restorations and that there would be an increase in the percentage of successes in this field. The evidence still does not show such an improvement but rather a discouraging lack of interest among too many practitioners.

Oral rehabilitation is understood by many practitioners to mean a complete reorganization of the mouth tissues, a complete change of the incisal edges and occlusal surfaces of the natural teeth in order to meet a new pattern and a new dimension; namely, increased vertical dimension. They believe that it involves much necessary engineering, mechanical and architectural procedures, and even the application of alegbraic formulas. Some of this or all of it may be true but in many cases it does not involve more than a simple procedure of grinding interfering cusps. Perhaps as a result of misunderstanding and fear of failure, we notice a lack of accomplishment. Of course, there are reasons why the complete oral rehabilitation program is not carried out.

It would seem that in many respects we are over-departmentalized and lack that coordination and cohesiveness between the clinical and science courses. This in a measure is poor training for the student for consideration of oral rehabilitation and preventive dentistry as an entity.

In my estimation an entirely new approach should be made to this problem by instituting a course of oral rehabilitation. This should include an accurate examination, diagnosis, an orderly and systematic procedure in treatment considering each individual operation as a step toward a final goal, whether it be a simple filling, occlusal adjustment, orthodontic treatment, or an increase in vertical dimension.

Oral rehabilitation procedures should be presented to every student so that it is understood as a complete treatment of the teeth and neighboring tissues. Such treatment should result in as nearly a normal or ideally healthy state as is possible. This health state should be maintained so that it will prevent injuries to tissues and especially the periodontal tissues. These procedures should condition the masticating apparatus in maximum efficiency with comfort and esthetic values.

Beyond the purely mechanical or technical ability of the operator there are more fundamental factors: the understanding of tissue-tolerance, the

proper placement of the mandible with the consequent normal relationship and temporomandibular articulation, the development of an acceptable free-way space, with the result of a harmonious functional efficiency.

We read and hear of abnormal conditions more so than normal conditions, and yet are we sure of what an exact normal condition is? Does it exist or is it a personal decision as to what is a normal or an ideal condition? We recognize an abnormal condition quickly and strive to rehabilitate to what is considered normal, because we accept a condition as normal. Different people present different conditions and problems but we do not rehabilitate with exactly the same type of restorations or treatment, nor do we, in each case, change the vertical dimension.

[Endocrinologists find a condition where the right side of a twin is similar to the left side of the other twin as seen in roentgenograms. One twin may develop a condition which is more severe than the other twin and requires different treatment and different restorative measures.] The dimension of jaws and teeth are different among patients, and the size of natural teeth do not comply with normal measurements. The normal complement of natural teeth totals thirty-two and each tooth is planned to function in its own right with its own anatomical form. When we replace some or all of the natural teeth with artificial dentures according to rehabilitation procedures, we restore with twenty-eight teeth, which is not normal. We start with an abnormal condition and finish with an abnormal condition; yet from the evidence, a healthy oral condition can be the result with mouth reconstruction procedures using twenty-eight teeth.

Since we find truth in such instances, of which there are many more, it would be logical to suppose that we work with conscientious effort to promote health for each individual with treatments and restorations suitable for such individuals, keeping in mind maintenance of health and prevention.

With the knowledge of the abnormal conditions that present to us for treatment, we find requirements for cleanliness of the oral cavity, fillings for deciduous teeth, extractions of deciduous teeth, revision or correction by grinding of deciduous and succeeding teeth. We also encounter need for orthodontic treatment, caries control, restoration of contacts, the larger fillings, crowns, bridges, the removable partial dentures, complete dentures, restorations for perforations and clefts of the palate and treatments of related tissues, to name a portion, all coming under the title of oral rehabilitation.

This being true, we must begin with the child. The dental examination of a child should be accompanied by an examination report of a physician. This may lead to a schedule in diet so as to improve the nutrition factors and consequently, with treatments, to improve the health picture of the dental patient. During the growth of the child there is evidence that the growth of the mandible differs over the other bones of the face resulting in under-development or over-development to the extent that malformations of the face bilaterally as well as unilaterally are promoted. We have the protruding chin, the receding chin and the receding chin accompanied with an open bite. Improper diet, malnutrition, habits, caries, malposed teeth, unnecessary or necessary early removal of deciduous teeth and lack of early dental care, including orthodontic treatment, brings us child patients for oral rehabilitation. In many cases, simple restorative measures are taken, treatment of surrounding adjacent tissues is given until the age necessary for orthodontic treatment for prevention and interception of malocclusion.

Dr. Charles R. Baker[1] states, "Orthodontic treatment is begun not after all the permanent teeth have erupted, and that about 90 per cent of his ptaients are in the mixed dentition class. Evidence has shown that malocclusion of the deciduous teeth is usually followed by similar abnormal conditions in the permanent dentition. In cases where the anterior teeth are out of occlusion, all the occlusal stress must be borne by the deciduous molars; these teeth will not be able to erupt to their normal occlusal height, while the anterior teeth will erupt to an excessive degree. If there is lack of occlusion of the posterior teeth, they will erupt to an excessive degree and usually the maxillary anterior teeth will assume a deep over-bite. If there is a cross-bite of one or more teeth, normal function will be impossible and the same type of malocclusion may be expected in the permanent dentition. Habits of the child which continually interfere with normal balance-pressure of the tongue, lips and cheeks on the growing dental apparatus are a handicap to normal development. Missing permanent teeth frequently are a cause of malocclusion. The facial development of an individual is influenced to a large degree by the size, form and relationship of the underlying dental structures. Normal occlusion of the teeth, therefore, is an important influence in normal facial development. Orthodontic treatment early in the development of this area is recommended to correct incipient malocclusion and to provide an opportunity for the subsequent development to proceed normally. Deciduous teeth should receive the same expert care as the permanent teeth."

Allan G. Brodie[2] says, "When the etiological factors which produce the malocclusions are environmental, the malocclusion can be prevented. Those forces or factors that may influence the teeth in a mechanical manner during or after eruption of the teeth often interfere with their proper positioning in the arch. Probably the most common environmental factors that interfere with the development of a normal occlusion are:

"1. Premature loss of primary molars and prolonged retention of primary incisors and molars.

"2. Habits such as thumb-sucking, tongue-thrusting, lip habits and pillow or resting habits—operating during the mixed dentitional period (from 6 to 12 years of age).

"All of these destructive factors are easily detected and corrected. In the case of the destructive oral habit, a complete understanding of why the habit was formed in the first place is necessary before one may make any effort to eliminate or transfer it. That means that the pedodontist must also be a psychologist and a parent as well as a dentist."

In spite of many sound school and caries-control programs, we are confronted with child rehabilitation problems. Students should be impressed and encouraged with civic efforts in helping to control caries in children, such as fluoridation of drinking water, school examinations, charitable work, prenatal diets, etc. Certain children's diseases are factors that promote treatment at an early age. Many cases of cleft palate and perforations present with malposed teeth, some as the result of early surgical interference. The remaining teeth require extraction or alteration with individual restorations to accommodate artificial removable dentures to which are attached the obturators and velums. Although effort can be directed to obtain a balanced occlusion of the remaining altered teeth, we find that we can only approach as near an ideal condition as possible.

During the teen-age there seems to be a period when parent influence and advice regarding care of the teeth does not seem important, and during this period of neglect caries is more prevalent. Some teeth are lost and masticatory deficiencies are not corrected. There is, consequently, movement and drifting of teeth, loss of contacts, periodontal involvement arriving at a state of malocclusion with all of its complications; all of which result, in a condition of the oral cavity requiring rehabilitation either with or without the necessity for a decrease or an increase of vertical dimension.

Generally speaking, persons requiring mouth reconstruction are in that group of individuals who have arrived at mid-life and beyond those

ages, and necessitates an entirely different method of approach and treatment than that which would be carried out on younger individuals. Accidents, growths of various kinds, faulty diet, careless mouth hygiene, habits, lack of proper development of the teeth and supporting structures, excessive abrasion, erosion and failure of the proper growth of the condyle are all factors promoting oral rehabilitation.

We must cope with infections of the soft and hard tissues, a greater or lesser loss of these surrounding tissues, pulp involvement, former dental restorations which are not in harmonious arrangement, temporomandibular joint disturbances, loss of facial contour and resulting complications. Systemic conditions of the general health affect the body chemistry such as diabetes, vitamin deficiencies, and debilitating diseases.

Much of the pathology found in the mouth depends primarily upon the presence of some teeth, alveolar abscesses, cysts, gingival infections, periodontal disease, etc., none of which are present in the edentulous cases. There are, however, some pathological conditions which occur in either the edentulous mouths or where teeth are present. Such conditions require the coordination of basic science knowledge as well as all of the clinical aspects of dentistry.

There are certain structural tissues involved which are important for consideration in the oral rehabilitation program, and which I will mention separately. One structure is the alveolar bone containing spaces and channels with blood vessels and nerve tissue directed to and from the periodontal membrane and periodontal fibers attached to cementum. Orban[3] states, "The structure of the supporting bone—that is the arrangement of its trabeculae—will depend largely upon stresses and strains within the jaw bone itself and upon the degree of occlusal force used in mastication or other occlusal functions. Separation of the bony structures surrounding the teeth into two functionally different units is more easily understood if we demonstrate the influence of proper use and disuse of the teeth upon these structures. In the normally functioning tooth the cementum is of uniform thickness, somewhat wider in the apical region and in the bifurcation of multi-rooted teeth. The fibers of the periodontal membrane are stretched between cementum and bone. About the disused tooth, we find first that the cementum of this root is much wider and more irregular. The periodontal membrane is narrow and no fibers can be seen stretched between cementum and bone. The most striking difference, however, is the lack of trabeculae in the supporting bone. The reason for this is that there is no occlusal functional stimuli for the supporting bone, and thus it is reduced. The

tooth is suspended in its bony alveolus in such a manner that all forces reaching the tooth functionally, in its long axis, are transferred to the bone as tension and the bone can resist the force very well. However, lateral forces applied to the tooth are transferred only to some parts of the tooth as tension, to others as pressure, and the bone becomes resorbed due to pressure. Crushing of the periodontal membrane, bleeding, necrosis, and bone resorption are the result of lateral forces acting upon the teeth. These tissue changes of course take place in partial denture work. A high crown, three-quarter crowns, clasps not well fixed, clasps sliding down on the inclined lingual surfaces of anterior teeth, and free-end saddle partial dentures are some of the main reasons for these changes."

The change in bony structure is quite marked in the older individual showing changes by means of the roentgenogram. The body of the mandible and maxilla shows changes, principally true where there is either no occlusion or a traumatic occlusion. Some absorption of the alveolar bone apparently is considered normal but it affects adversely our efforts in reconstruction from the standpoint of tooth support and saddle support. There are different changes in different areas which are covered with saddles. One area lies between teeth used as abutments and the other area extends under free-end saddles.

The fixed clasp or attachment cases for free-end saddle partial dentures are tooth borne at the abutment teeth and become tissue borne gradually as the area reaches the extremity of the saddle causing undue leverage and stresses to the abutment teeth and conducting those stresses to the periodontum. There are cases where one side of the partial denture is tooth borne and the other side has a free-end saddle. Of course the bilateral free-end saddle cases, such as a typical lingual bar, presents the most difficult problem; and regardless of whether the remaining natural teeth are placed in occlusal balance, we find too often periodontal tissue involvement in the form of damage.

The many variations and degrees of changes in saddle areas, and subsequent soft and hard tissue injury require various methods of procedure. There is debate among many operators regarding the method of procedure. Some men assume the responsibility for rigid clasp to saddle relationship and some for the broken stress relationship. In each case saddles should cover as great an area as is possible, and in upper cases, whether palatal bar or horseshoe design, there should be wider and more extensive support for the artificial teeth. The main reason is to prevent injury to the soft and hard tissue, especially the periodontal tissue.

Withers[4] tells us, "The tissues of each individual react differently to outside influences. Fortunately nature has, in addition, provided each healthy individual with a margin of safety beyond normal functional requirements which we may designate as the physiologic limitation of tissue tolerance. When an influence exceeds this margin of safety, it exerts a destructive action on the tissues. So long as an influence remains within the margin of safety, it is physiologic and exerts a beneficial action on the tissues. The margin of safety in tissue reaction for an individual may be broad or narrow and is influenced by age, systemic condition, and environment. On this changeable biologic foundation rests the success or failure of all dental restorative procedures. Successful partial denture construction depends upon the coordination of biologic and mechanical engineering principles. We are forced to use a mechanical appliance to restore lost function in a biological field. It is most fortunate that nature has wisely provided each individual with a margin of tissue tolerance beyond that of physiologic functional requirements. If we keep the forces exerted on the foundational structures within the realm of tissue tolerance for that individual, the appliances will function physiologically and prevent the development of pathological influences."

Related to the alveolar bone and periodontal tissue is the gingival tissue. It should be emphasized that care must be exercised in restorative procedures to prevent marginal gingival inflammation, hypertrophy, food impaction, periodontal injury, pocket formation, loss of bone and eventual loss of one or more natural teeth.

Perhaps our knowledge of the etiology and treatment of periodontal disease is inadequate, yet we can exercise every precaution with our restorative work toward prevention and maintenance of this disorder. Some of these departments of dentistry may fall into the category of specialties, but to carry out a program of oral rehabilitation and to accomplish the purpose in all of its phases, it becomes necessary to develop into a competent orthodontist, periodontist and prosthodontist.

Regarding periodontal disease and treatment, Dr. Dorothea P. Radusch[5] in one of her splendid articles states: "More teeth are lost by adults from periodontal disease than from dental caries."

Following is a brief review of some of the tissues that we must be concerned with in oral health problems. It becomes our obligation to consider the tissue which moves the mandible, namely the muscle tissue. Niswonger[6] shows that the position of the mandible as it is related to the maxilla depends upon a group of muscles and that this position

determines the height of the face. Niswonger defined it as, "that position of the mandible in which it is involuntarily suspended by the reciprocal coordination of the muscles of mastication and the depressor muscles, with the upper and lower teeth separated."

The muscles of mastication are the temporal muscle which raises the mandible in centric position and also retrudes the mandible; the masseter muscle, with similar action to that of the temporal muscle; the internal pterygoid, which elevates the mandible and aids in protrusive and lateral movements, and the external pterygoid the principal action of which is the protrusion of one or both condylar heads. The muscles of depression of the mandible are the mylohyoid, the geniohyoid, the genioglossus, the infrahyoid, the digastric and the external pterygoid.

Kazis[7] states, "The muscles of mastication must be considered when changes are made in the position of the mandible for the purpose of restoring lost vertical dimension, and their action must be balanced properly and coordinated to obtain the utmost functional efficiency. The muscles of depression aid in the action of opening the mouth and aid in obtaining the physiologic rest position by depressing the mandible."

The relation of the mandible at rest position to the maxilla is stable and it is not altered except by injury or disease, muscle trismus, the degree of consciousness and the normal but slow aging process during the lifetime of an individual. The stability is maintained by the equilibrium of the muscles attached to the mandible, based on the physiological principle of all skeletal muscles returning to their given resting length following functional contraction and elongation. The various muscle groups are coordinated by mutual and reflex innervation to maintain the rest position and to create the various functional mandibular movements. All functional movements begin from this position and the mandible returns to its resting position with the cessation of the functional movement.

As Mershon[8] states, "One group of muscles opens the jaw and another group closes the jaw. When both groups are at rest, a slight space is present between the occlusal surfaces of the mandibular and maxillary teeth. The length of the muscle which controls the mandible determines the extent to which the posterior teeth erupt, but regardless of the extent to which they erupt, when the muscles of mastication are at rest, there is always a space between the occlusal surfaces of the posterior teeth. If this was not so, the muscles of mastication would be under a constant strain because they would always be stretched beyond the point at which they could relax completely. When a nerve

or group of nerves is stimulated over a period of time, without interruption, by a constant contraction of a muscle or group of muscles, a nervous irritability due to fatigue is set up. The function of the oral cavity is dependent upon the action of the nervous system and upon the muscles which control the mandible. This bone is suspended from the base of the skull by the muscles of mastication, the ligaments of the temporomandibular joint and other ligaments. As a result of the action of the muscles as directed by nerve stimuli, the mandible functions in mastication, swallowing and speaking. The alveolar bone is modified by muscular action only as far as the forces of mastication affect it indirectly, when the teeth are brought together. The temporomandibular joint is constructed in such a way that it has a great latitude of movement. It can accommodate itself to any position into which the muscles which control the movement of the mandible are capable of moving it.

"Any effort to change the operation of this joint places a strain on the muscles of mastication; in order that this be relieved, the adaptable alveolar bone resorbs until the joint is once more in its normal position. Muscle is dominant; it cannot shorten or lengthen and it cannot remain under tension indefinitely. Therefore, the other tissues change and adapt themselves until the muscles are relieved of all strain."

Much of the advancement made in the past years in oral rehabilitation is due to our knowledge of anatomy, histology and pathology. The study of the various tissues, the type of these tissues, the function of these tissues and the relationship of these tissues has given us a keener appreciation of the requirements of serviceable and healthful restorations.

Excessive grinding of teeth, which in some cases causes a slight reduction in vertical dimension, lack of occlusal adjustment where needed, excessive increase in vertical dimension, all tend to affect the health and function of these tissues. We have experienced cases where an increase of vertical dimension was necessary following a haphazard grinding of teeth. In some cases when elongated, malposed, tipped and rotated teeth are present, other means at our disposal must be employed to correct this condition. We should not hesitate to remove one or more natural teeth which would interfere in placing the masticatory mechanism so mechanically correct to assure a proper balanced occlusion.

In whatever way occlusal balance is established, whether by building up deficient areas or by gringing interfering areas, a harmonious relationship and freedom of all the mandibular movements must be established and maintained in order to render the greatest possible service to the patient. In such cases where some of the teeth are in disharmony and

where no natural teeth are missing, a proper occlusal balance can be restored with conservative grinding and with fillings, inlays and crowns.

Those cases where some but not all of the teeth remain require more extensive restorations such as fixed and removable partial dentures. The teeth that remain in the arches must be placed in proper balanced occlusion before any of the larger restorations are inserted, permitting normal movements of the mandible in its excursions during function. After balanced occlusion is established, and in some cases with an adjustment of vertical dimension, among the remaining individual teeth, it is of equal importance that the artificial substitutes for the missing teeth bear the same relationship to each other.

One of the most important steps in the construction of any partial denture, termed mouth preparation, in addition to individual restorations which function properly is the alteration of some of the teeth by changing the anatomical form to accommodate retentive means. Many times tipped, drifted, rotated teeth, extruded and sub-occlusal teeth require careful consideration by alteration with individual castings. When these problems arise, it becomes necessary to refer to the length and form of the roots and periodotal attachment as it relates to increased leverage. In some cases orthodontic treatment by only slight movement or uprighting is necessary for improvement. In all of these instances the proximal surfaces and neighboring space for the artificial restoration should be contoured to aid insertion and to prevent food traps.

The particular anatomical form of the lower bicuspids, especially the lower first bicuspid often requires alteration. The buccal portion and cusp is very prominent and the lingual portion diminishes, having a ligual-occlusal groove from the central groove which cuts over the mesio-lingual portion gingivally. In some forms these teeth resemble a thick cuspid. Restoring these teeth with a 3/4 crown or full crown alters the form for improved occlusion and accommodates retentive means. A great deal of improvement in stability of the partial denture can be accomplished by including rests in dovetail inlays in the anterior teeth where they are adjacent to one or more artificial teeth. To a great extent, comfort depends upon retention and yet we must avoid tissue trauma. The retention of a partial denture must be planned so as to function not only as retentive means but also in the nature of a splint. The direction and distribution of occlusal stresses must not exceed the tolerance of the several tissues.

Oral rehabilitation includes those cases where there are symptoms of loss of the normal occlusal relationship, temporomandibular disturb-

ances associated with a loss of vertical dimension, and loss of a normal free-way space. Such a condition when extreme is often accompanied with cracking noise, pain, trismus of the masticating muscles, burning sensation of the tongue and ear disturbances. The treatment of these cases usually requires the combination of a grinding operation of some of the interfering areas and the building up of other areas, resulting in a functional occlusal balance and a free-way space of two to four millimeters.

It is useless to this body to discuss the technique involved for increasing the vertical dimension in this paper. According to the literature under the title Oral Rehabilitation or Mouth Reconstruction, the greatest portion covers this technique in particular. It was the intention of this presentation to cover the many important related phases which must be a part of this program.

One of the best means of impressing upon the student's mind the importance of conditions often overlooked in a routine mouth examination is to have a diagnostic clinic composed of competent members of each department, having a dentally minded physician aid in the examination of selected patients after the student has completed his own examination of that patient, so that conditions can be pointed out that would otherwise be entirely overlooked or considered unimportant to that student.

The technical progress made in the field of prosthetic dentistry has contributed a great deal to the comfort and happiness of a large group of the population. In this field the contributions to progress have come from individual teachers who by their ingenious adaptation of physical principles and by experimentation with new technics have developed a system of restoring missing teeth in a satisfactory manner for comfort, appearance and function.

I know that many of the suggestions listed above would strain the budget of many of our teaching institutions by including more manpower than is now available, and to secure men who are genuinely interested in teaching. Perhaps a graduate course for dental teachers, who consider teaching as a career, should also be made available.

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Discussion

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Dr. Silberhorn has presented a rather thorough review of the problems of oral rehabilitation, and of its place in the dental school curriculum. He is to be complimented on the care with which he has considered all the phases of this problem.

I believe that Dr. Silberhorn raises a very important question when he asks "Are we sure of what an exact normal condition is?" Many of us have a tendency to set up certain conditions that we may consider normal and then try to make the patient fit this concept. This is particularly true for junior and senior dental students who, having a minimum of experience to serve as a guide, try to make the patient fit the rule. It is in these cases that we, as clinical teachers, must try to broaden the student's background by careful explanation at the chair as to why we cannot carry out certain procedures that seem indicated to the student. Perhaps this would be of some help in teaching the student that what is normal for one patient may not be for the next one.

The plan of having a diagnostic clinic to examine selected patients after the student has made his examination should do much toward giving the student a broader outlook on the treatment of dental abnormalities. We might also be able to better the student's concept of oral rehabilitation by placing less emphasis on the number of inlays, foils, etc., and more emphasis on the number of patients whose mouths were completely restored to as normal a condition as possible. By selecting these patients from the different age groups, we should be able to provide the student with a variety of problems. In solving these problems, the student will be considering the mouth as a whole, and at the same time will be gaining skill in the various phases of dentistry.

There are many other problems presented by Dr. Silberhorn that we might discuss, but I would like to close with a note of thanks to Dr. Silberhorn for the excellent way in which he showed the role of the child patient in oral rehabilitation and for his plan of treatment for the

partial denture patient before the actual construction of the partial denture is started.

2. Periodontal Aspects of Prosthetic Restorations

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Dental teachers are faced with the responsibility of imparting as much knowledge as possible, and to accomplish this objective within the allotted time. The curriculum is crowded, and the course content, therefore, must be screened very carefully. If this is not done, there is no opportunity to replace material of lesser importance with that of greater importance.

We cannot reasonably expect dentists to be qualified as specialists at the time of graduation from dental school. The factors of greater experience and special training must be added before concepts can reach maturity and judgment attain full fruition.

It is the main purpose of this paper to point out some aspects of periodontia which are worthy of attention, and to suggest ways in which they might be presented to dental students. As the title suggests, the main emphasis will be on that portion of periodontia which is of particular interest to the prosthodontist.

We are all aware that a wide range of effects, good and bad, may result from the presence of prosthetic restorations in the oral cavity. We know that the supporting tissues are able to withstand certain amounts of stress without ensuing pathological changes. There is a limit, however, beyond which the toleration cannot go, and it is in this sort of situation that pathological changes occur. The limit of tolerance will vary from individual to individual, and even from time to time during the lifetime of individuals.

As an example of individual variation and the divergence of opinion with regard to certain concepts, let us briefly consider alveolar bone. Most dentists probably would agree that local and systemic factors are capable of causing damage to alveolar bone. Age is often cited as an important factor in the structure and resistance of bone. As a matter of fact, extreme alveolar resportion is sometimes seen in young persons. Glickman, in commenting on bone, says, "Disequilibration in the microscopic elements of bone is no respecter of age."

Our understanding of the reasons for these variations is not complete. However, there is a large body of basic knowledge, growing year by year, which affords many clues. We say that the dentist must have

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a sound training in the basic sciences if he is to be capable of designing and constructing restorations to meet biologic demands. Diagnosis, treatment planning and prognosis should be considered very carefully, with each case presenting its particular problems.

Perhaps there is a general tendency to associate "dense" bone with high resistance, and "thin" bone with lowered resistance. Orban[3] points out that this is not necessarily true; nature may compensate poor quality with quantity. Therefore, we should not take it for granted that bone is strong because it is dense.

As in the case of bone, so it is with cementum, gingivae and periodontal membrane. Local and systemic factors may work for or against the success of prosthetic restorations.

Restoration of function is a requisite for prosthetic restorations. Esthetics and comfort are additional factors which must be emphasized. It is highly desirable that these requirements be met without contributing toward the detriment of the teeth or their supporting structures. In fact, it is often desirable, and within the bounds of achievement, to have the restorations exert a beneficial influence on subnormal tissues. On the other hand, improper design, faulty technical procedures and lack of understanding may produce pathology in a healthy mouth. It is here that basic sciences play an important part. That is why we ponder methods of correlating basic sciences and clinical procedures. Let us not, however, fall into the unenviable position of graduating dentists who are well informed biologically and devoid of the necessary technical ability.[4]

Periodontists have made many helpful suggestions related to the design of prosthetic restorations. Thomas,[5] and others, have made pertinent observations and comments on certain dangerous procedures. Bring periodontal pathology under control before proceeding with reconstruction. Beware of the tissue damage due to insufficient saddle coverage, and the damage which may result from free-end saddles. Gingivitis and periodontal detachment may be induced by terminating the margins on a thick or escalloped border.

Clasps may impinge on the gum margin and initiate pathological changes. Insufficient interdental spaces between pontics and abutments may result in food impaction with attendant gingivitis. Lingual bars, pressing upon, or cutting into gum tissue, are capable of causing inflammation, periodontal detachment, bone resorption and root resportion. The author has seen cases of root resportion and pulp exposure caused by the pressure of lingual bars on gum tissue.

Avoid the creation of excessive lateral forces. Vertical stresses are tolerated to a much greater degree than lateral stresses. Do not expect teeth which have been out of function or in sub-physiological function, to suddenly assume greater stresses without damage. Rest periods are sometimes indicated for teeth before subjecting them to the added loads created by clasps or rests.

Do not place rests on inclined surfaces. They should be designed and placed to bring stress in a vertical direction, especially where the appliance is mostly tooth borne.

The following recommendations seem valid in the light of present knowledge:

1. Design clasps to cover the smallest area of tooth surface that is consistent with retention.
2. Design restorations to permit seating and removal without excessive strain or movement of teeth.

Inlays and crowns should be designed and constructed according to accepted concepts. Thomas,[6] Fee,[7] Bryan,[8] and others, have emphasized the importance of contour and contact form and position. Overhangs invite pathology by irritating the gingivae.

If we carefully build our restorations in accordance with biological principles, they will meet the requirements insofar as it is possible to do so by artificial means. This type of restoration will remain efficient and comfortable for a longer period of time than those which are constructed without regard for basic principles.

We should save as many of the natural teeth as seems wise under the guiding principles of diagnosis and prognosis. Each case is a study in itself; we cannot lay down inflexible rules for diagnosis, treatment or prognosis.

Tooth form and anatomical markings should, for the most part, conform to the anatomy of the remaining natural teeth. Avoid excessively broad occlusal surfaces and deep cusps. Anatomy and physiology must receive attention in the consideration of rest position and interocclusal clearance.

A definite program of oral hygiene should be taught to each patient, and the program should be modified to meet individual needs. Patients should be recalled at definite intervals for check-up examination and the correction of developing faults.

Operators should have the highest regard for the welfare of the supporting tissues. Saddles, to be well tolerated, must cover enough tissue area to distribute stress loads adequately. All procedures should be carried out with the least possible injury to the supporting tissues.

It has been said that the individual missing tooth is perhaps the most prolific factor in accentuating periodontal disease.[9] At the same time, we should bear in mind that faulty artificial substitutes may cause great damage.

Although our knowledge is far from complete, great improvement would result from doing our level best in each case. Utilizing present knowledge to the full, and being on the alert for improvement, would raise the level of our service to patients.

Thoroughness in oral prophylaxis, one of the most important factors in the health of the periodontium, is sadly neglected in many instances—skipping over important details in order to "get on" with the construction of restorations. Eliminate periodontal pathology before proceeding with reconstruction.

With this rather brief appraisal of some of the common problems of periodontists and prosthodontists, we come to a consideration of satisfactory plans for teaching these things to students. There are at least four important factors to be emphasized:

1. Teachers
2. Students
3. Course content
4. Methods of presentation

Teachers should be capable, enthusiastic, possess imagination and be on the alert for improved methods and materials. Students should have the proper attitude toward learning. It is in this area, among others, that important changes must be made before teaching efforts can become fully effective. Teachers can stimulate students and point the way with helpful suggestions and demonstrations. This, however, will not suffice unless the students are eager to learn.

Research in methodology in education has supplied a great fund of information, all of which should be familiar to dental teachers. We must have increased and continuous zeal for learning among teachers and students if we are to achieve the best results.

Interdepartmental discussions provide a mutually helpful method of disseminating knowledge. Timing is important in the presentation of courses. A close bond between learning skills and their practical application is desirable. The longer the interval between a preclinical course and the practical application of its subject matter, the greater the tendency to forget what has been taught. A certain amount of repetition is necessary, although repetition per se is not all that is needed.

Students must be stimulated—not once, but many times. They must

develop an "attitude of mind." Teachers should make every attempt to foster a keen appreciation of research and the benefits to be derived from the literature of dentistry.

The dentists of America have many reasons to be proud of their heritage. Those who teach should carry on in the best tradition.

I believe that one of the greatest needs in dental education today is a change in the attitude and concepts of dental students. These changes can be achieved by the students themselves, if they are given a reasonable amount of help and encouragement by their teachers. This sort of program should begin in the freshman year and carry through to graduation. It is in this direction that dental teachers and students may hope to mount the highest pinnacle of achievement.

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II. RELATION OF INDIVIDUAL DEPARTMENTS TO A CENTRALIZED DEPARTMENT OF DIAGNOSIS AND TREATMENT

1. The Relation of the Departments of Endodontics and Periodontics

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The teaching and practice of edodontia and periodontia require close cooperation among all departments of dentistry. The diagnosis and prognosis of pulpal, periapical, gingival and periodontal disturbances require clinical experience and judgment as well as an understanding of such fundamentals as growth, function and pathology.

I believe, therefore, that the problems of diagnosis, treatment-planning, and estimating prognosis in endodontia and periodontia are the responsibility of those who instruct in these subjects and should be decided and taught by those instructors rather than in a centralized diagnostic clinic. Unless the centralized clinic could be staffed by several supermen, instructors in the endodontic and periodontic departments would be called continually to the diagnostic clinic for consultation, or the diagnosis and treatment plan from the centralized clinic would be altered frequently as treatment got under way.

The admitting clinic, or what might be considered a central diagnostic clinic, with which we are associated at the University of Illinois, performs several functions. One is a filtering function through which individuals that are not suitable for a teaching clinic are rejected for admission; a second is an appraisal of the prospective patient's physical and emotional status; a third is an oral examination to determine the type and extent of treatment needed; and a fourth is a routing of the patients into the clinics providing the indicated treatment.

The preliminary filtering process is done largely by the admitting clerk at the patient's first visit. The name of the organization or person by whom the individual was referred to the clinic is ascertained and the reason for the patient's application for treatment is noted. The patient's ability to keep regular and frequent appointments is determined; his ethnic origin, age and occupation are recorded. This general information is then sent to the examining dentist and he reviews it with the student group assigned to the admitting clinic for that particular period. An appraisal of the information is made before the patient is seen and

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suggestions are offered concerning what possible associations and correlations should be kept in mind during the interview and examination.

The patient then is brought to the examining room and his general characteristics noted as he proceeds to the chair. After a series of questions designed to provide information about the temperament, the health, and the oral symptoms of the patient have been answered, a dental inspection is made and the patient is referred to the Department of Radiology for intra-oral roentgenograms of both arches. If any laboratory tests are indicated to determine better the patient's physical status, they are ordered, and if the patient has been referred by the University Hospital, a request is issued for the hospital record.

At the patient's second visit, the full mouth roentgenograms, laboratory analyses, hospital data, and further questioning are utilized to make an appraisal of the patient's general health, his probable oral needs, his temperament and suitability for use in the undergraduate teaching program. A detailed examination of the mouth then is made and charted on the patient's dental examination history form. The examiner with his student assistants then decides the clinical division that will be most concerned with the treatment required by the particular individual. For example, if the bulk of the treatment is cavity preparation and filling, the patient is sent to the operative clinic; if it involves several crowns and fixed bridges, he is referred to the crown and bridge section. We have four clinical departments to which the majority of patients are referred; these are Full and Removable Partial Dentures, Operative Dentistry, Crowns and Fixed Partial Dentures, and Therapeutics, which includes endodontics and periodontics. A list of these departments is printed on the cover of the patient's dental history folder, and the examiner indicates after each department by the numerals one to five the order in which he places the clinical needs of the patient. The patient proceeds to the department marked number one.

Many patients require periodontic or endodontic treatment as the foundation for further restorative service; they are therefore referred to the division with which I am associated. The patient comes directly to the clerk in this department, who has a list of students desiring experience in the treatment indicated in the history that has been compiled in the Admitting Clinic. The clerk arranges an appointment for the patient with one of these students.

On the third visit of the patient, which is the first with the student who is to administer treatment, a review is made of the history and dental examination. The pulpal or periodontal condition that is of major

concern is carefully investigated. In periodontal cases it may be desirable to take impressions and develop casts to augment the study. After a decision has been made concerning the specific diagnosis, the possible complications, and the probable prognosis, a suggested plan of treatment is recorded on the patient's chart. The student then takes his patient for further expert consultation to the other clinical departments that may be concerned with the complete restoration of the mouth. An instructor in each department reviews the suggested plan of treatment and either gives his approval or questions the proposal, in which case a consultation with the departments concerned is held and an agreeable decision reached. After the student has secured the written approval of all the departments that will be involved in the treatment of his patient, he returns to the department in which he initially planned the treatment and begins his clinical operations. He is responsible for the completion of treatment in all departments and at the conclusion of treatment in one department he immediately proceeds to the next department indicated in the approved plan and makes his appointment for the succeeding visit. When he has completed all treatments and restorations, he takes the patient to the admitting clinic and the final dismissal of the patient is approved through the channel by which the patient was admitted.

While it may seem that considerable time is consumed by the student's taking the patient from one department to another to get approval for his final plan of treatment, I believe that time is well spent. He gets considered opinion where instruction is expert. When differences in opinions exist among departments he gets the benefits derived from the discussion that ensues. He gets to know his patient, the problems that the patient presents, and he sees the solution of those problems as treatment is completed. This end is better accomplished through these channels than it would be by working with patients who had had a diagnosis and treatment plan tailor-made in a centralized diagnostic clinic.

The Admitting Clinic at the University of Illinois conducts a weekly diagnosis conference attended by all third and fourth year students. Patients of particular interest as well as some routine cases are the subjects of these seminars. A fourth year student is assigned the task of gathering the necessary data about the patient and of making a diagnosis and treatment recommendation. A third year student is appointed to assist the senior in the preparation and presentation of the case. Faculty representatives from each department attend these weekly conferences. Each case is presented by its respective student and the other class members are allowed to question and discuss the decisions

offered. Faculty members as well as students participate in the discussions. This activity serves in a sense as a central diagnostic service, and has a useful function in teaching. In addition to the conference, there is a formal lecture course on diagnosis which meets one hour each week throughout the fourth year.

In conclusion, I wish to state that I believe diagnosis and treatment planning can be done best through individual consultation among the student, his patient, and the department involved. The student has the opportunity to diagnose and to plan treatment from the beginning in contact with instructors well informed in the restorative problems involved. While he works with specialists in making and executing his plan of treatment, he has the satisfaction of completing the entire treatment of the oral cavity and of correlating the discussions prior to and during treatment with the results obtained. This practice gives him a general prospectus that is desirable.

Many problems in diagnosis and treatment planning are brought about by pulpal and periodontal disease. Our admitting clinic serves well in providing a general history of the patient as well as specific information about his physical and emotional condition, but decisions concerning treatment are left entirely to this department working in cooperation with other clinical departments.

2. The Relation of the Department of Roentgenology

DONALD T. WAGGENER, D.D.S.,[5] *Lincoln*

The seal of the newly formed American Academy of Oral Roentgenology contains this phrase, "Oral Roentgenology, the Keystone of Oral Diagnosis." This symbolizes very well the importance placed upon the use of the roentgen ray as one of the foundation stones in the field of oral diagnosis. It is a well accepted fact that accurate, careful and complete diagnoses of the teeth and surrounding structures should not be attempted without the proper use of dental roentgenograms. It should be obvious, therefore, that roentgenography plays a very important part in the function of a department of diagnosis.

It is my feeling that any department of oral roentgenology has two primary objectives or missions which it should strive to fulfill. In fulfilling these two missions the department automatically performs a service for the department of diagnosis. The first objective is that of teaching proper roentgenographic technique. We cannot interpret that

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information from a film which is not found depicted in the various shadows of the structures through which the roentgen ray has passed. Therefore, the very first building block in roentgenology is that of proper film placement, tube angulation, and proper operation of the dental unit. These procedures we call technique. Our experiences at the University of Nebraska will be discussed with regard to technique later in this paper.

The second objective or mission, that any department of roentgenology should seek to attain, is that of correct interpretation of the film. Any technique which places films in the hands of the students or dentist which have many diagnostic qualities automatically clears some of the haze and confusion from the process of interpretation of the various shadows on the films. These shadows are expressions of differences in densities of the tissues through which the roentgen rays have passed, whether those tissues be normal, abnormal, pathological, or combinations of these types of tissues.

After the dental roentgenogram has been produced by a technique which incorporates in the finished film all of the desirable diagnostic qualities that can be attained, and after the student has been thoroughly grounded in the proper interpretation of the shadows of the teeth and the various densities of the other structures depicted upon the film, then and only then has the department of roentgenology rendered the best service to the department of diagnosis. The first mission of the department of roentgenology, that of teaching roentgenographic technique, probably is not accomplished to its fullest extent in those institution where technicians perform the procedures of exposing the films in the mouths of the patients whom the students will treat. Most graduates, especially those not in metropolitan centers, will find it necessary to carry out their own roentgenographic procedures. It is highly desirable, therefore, that every student be capable of making a complete mouth roentgenographic survey in a satisfactory manner.

It may be said there are two main classifications of findings depicted in dental roentgenograms. The first is that of normal structures and their variations. The second is the changes which occur as the result of a pathological process or other abnormality. Many of the problems, then, concerning interpretation of films are concerned with the question, is this a variation of a normal structure, or is this an abnormal or pathological condition? It would seem, therefore, that the most common and frequent manner in which pathological conditions of the teeth and their supporting structures are encountered is by means of dental roentgenograms. Why would it not then be desirable for a very close bond of

effort to exist between the departments of pathology and roentgenology? If the dentist is going to see in his patients the evidences of abnormalities and pathological changes as they are depicted in the processed dental film, why then should not a very great amount of emphasis be placed in pathology upon the roentgenographic aspect of the various lesions discussed? Students then should have a better understanding of the tissue changes which they will see illustrated roentgenographically more frequently than in any other way. We are in a rather unique position at the University of Nebraska, in view of the fact that the courses are integrated in a manner which permits this. Therefore, the student is taught the nature of the tissue changes which cause the images on film, which are interpreted as a pathological or abnormal condition. This allows him, when he sees evidences of these changes in the film, to place the proper interpretation upon his findings and thus be able to plan appropriate treatment based on an accurate diagnosis.

I wish now to spend a little time discussing teaching experiences with certain technical procedures we have been using for the past five years. We feel these procedures have decidedly improved the diagnostic qualities of the films and automatically rendered them more interpretative, which in turn renders a great service to the diagnostic department. These technical procedures have been referred to by various names, such as the long cone technique, the paralleling technique, and the extension cone right angle technique. This procedure applies to the entire tooth and surrounding structures those factors which are applied to the crowns of the teeth in bitewing exposures. Recently one of the large publishing companies made a survey of the dental schools to determine the potential market for a book on this technical procedure. Nearly 50 per cent of the schools replied that they taught this technique, either in conjunction with the bisection of the angle technique, or entirely replacing it. It seems well, therefore, that at this stage a report be made upon our experiences in using the extension cone right angle technique and teaching it to undergraduate students during the past several years.

Many objections have been raised to the teaching of these procedures to undergraduate students. These objections have been expressed largely by those who have not had experience in teaching it. Often mentioned are such things as the necessity for buying new X-ray units and pieces of equipment, that the technique requires much time, and that the procedure is too difficult. Some teachers feel the extension cone right angle technique should be taught only to postgraduate or graduate students. This technique was taught first to our sophomore students in the 1947-48 academic year. Our experiences will furnish answers to

most of the objections mentioned earlier. During the same year the junior students, who the previous year had been taught the bisection of the angle technique, were given instruction in the use of the extension cone right angle technique. The senior class received no instruction in this new procedure. It was interesting to note, however, that many of the seniors, before the year was completed, asked that they be given instruction, for it was obvious to them that the sophomores and juniors were producing films with better diagnostic qualities. No effort will be made to go into the technical factors involved in the practical application of the procedure.

However, there are a number of aspects to the practicability which I would like to discuss. One of the first is that of space. It is not necessary to use more square feet of space or to utilize larger cubicles or rooms than is necessary for any other dental roentgenographic technique.

It is not necessary (this is contrary to what some manufacturers would have you believe) to purchase new X-ray units or to make any significant modifications in those which exist. X-ray units several years old may be used. The only modification of the unit which is necessary is that of removal of the short pointed cone and the attachment of a correctly diaphragmed open and extension cone, for the use of a target-film distance of 12, 14, 16 or 20 inches. We attempt to use a 16- or 20-inch distance wherever possible. The increased target-film distance makes it desirable to use a film with a fast emulsion. Several film manufacturers market such films and there is no increase in the cost of these above the cost of other dental films made by reputable manufacturers. Film mounts for all sizes of films and for surveys using various arrangements and numbers of film windows in the complete survey are available commercially. Therefore, it is obvious from the standpoint of floor space, the X-ray unit itself, the cost of films, and the availability of mounts, there is nothing which makes the technique impractical.

Now comes the question of time. It has been said that it is a very time-consuming technique and that a dentist in private practice cannot afford that much time. The following is revealed as a result of a survey among our students as to the time they spend making a complete mouth survey using 24 films.

Average Time in Minutes by Students Using Extension Cone Right Angle Roentgenographic Technique

	Sophomores	Juniors	Seniors
Survey (24 films)	60	42	29
Average per film	2.5	1.75	1.21

It is evident that film for film this technique is no more time-consuming than any other technique. It is true that as more films are exposed for a complete mouth survey, the time is increased proportionately. This is true regardless of the technical procedures used. However, it is our feeling that with this technical procedure we have placed in the hands of our students not only instruments with which they can make a more adequate survey, but also technical procedures which they can use to more clearly depict the structure of the teeth and their supporting tissues. Therefore, 20 periapical views and four bitewing views are utilized as the routine survey.

Let us look now at some of the qualities of the finished film. It is obvious that the absence of distortion of the images of the teeth, the sharpness of detail, the absence of excessive amounts of fogging by secondary radiation, the minimal enlargement of the images of the teeth, and the long scale contrast embodied in the finished film, are all desirable diagnostic qualities which will allow the dentist to more accurately interpret the significance of the images on the film. We have found that after the students are accustomed to viewing these films and become familiar with films embodying these qualities, that they are dissatisfied with those films which do not have these diagnostic qualities. Therefore, it has raised their goal of achievement in the field of dental roentgenology. They know that it is possible to produce this quality of film, they know that they can more accurately interpret their findings, and they know that they are no longer using a technique which in itself tends to limit their abilities. It is then a great source of satisfaction to find that most of the students are raising their standards of qualities of what constitutes a properly exposed and developed film.

Our observations are that students can easily visualize two parallel objects, the film and the tooth, and direct the extension cone at a right angle to those objects. An open end cone allows a further observation, that of aligning the open end of the cone, the tooth and the film, parallel with each other. The exposure, with the objects in such relationships, results in "periapical bitewing films." No more hours are needed for instruction in this procedure than are needed in the bisection of the angle procedure. With the same number of hours of instruction the average student will produce films which embody diagnostic qualities not attainable in most cases by other techniques. This indicates this procedure is not more difficult to use than other techniques.

There is no clinical department in a dental school which should not be interested in the quality of the roentgenograms produced by the

department of roentgenology. Every clinical department will find that the diagnostic qualities of sharpness of detail, minimal fogging, anatomical accuracy of images of the teeth and surroundnig structures, minimal enlargement of images of the teeth, and long scale contrast, will better depict the dental and associated structures for the particular use each department has for roentgenograms. I will show slides to illustrate the application to the fields of surgery, periodontia, endodontia, pedodontia, operative dentistry and prosthetic dentistry. You will note also the quality of the films made by students.

It is my feeling that one of the goals we need to achieve in the various departments of roentgenology is that of improving our technical procedures so that when the film is interpreted it is not necessary to take into account the shortcomings of the technical procedure and make allowances for them. If departments of roentgenology are to keep pace with the advancements which have been made in the other fields of dentistry, then we must take full advantage of all of the technical procedures which are available to us to produce films embodying all the desirable diagnostic qualities obtainable. In this manner we automatically make it easier to fulfill the mission of teaching interpretation, thus rendering a better service to the department of diagnosis. These are the results because the student has a film for study which depicts the true conditions in the tissues in their proper relationships to one another, sharply detailed on the film, so that interpretations can be more accurately made.

3. The Relation of the Department of Crown and Bridge Prosthesis

DOUGLAS H. YOCK, D.D.S.,[6] *Minneapolis*

In reviewing much of the literature published on the prospectus of the operation of a centralized department of diagnosis, I was overwhelmed by the number of things the department of oral diagnosis has had recommended to it for accomplishment.

The changes being made in the development of departments of oral diagnosis are somewhat analogous to the development of the teaching of "Children's Dentistry" in dental schools. Not too many years ago, pedodontics was usually taught as a part of a division, in most instances, that of operative dentistry. Pedodontics was elevated to its divisional stature, not because it isn't an integral part of operative dentistry, but

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because it was imperative for many reasons that "Children's Dentistry" receive considerably more emphasis in all curricula. As you know, recognition of the need led to the establishment of good departments of pedodontics. The numerous discussions, papers, recommendations, self-analysis of each school, served to accomplish this goal.

Likewise, the work and the report of the Curriculum Survey Committee, the work of the Committee on Oral Diagnosis, the resulting numerous discussions, the recommendations and papers, the self-analysis by each faculty of its own individual situation has resulted in the emphasis and continuing development of the departments of oral diagnosis.

The genial controversy over "centralized" versus "decentralized" departments is accomplishing a purpose and is having its beneficial effect.

We of associated departments have been forced to examine objectively the leveling criticism of the decentralized plan of operation of an oral diagnosis department, as it involves activities of our individual departments. May I summarize, without direct quotations, what I think to be the implied and expressed criticism of the instruction a student receives in diagnosis and treatment planning from the individual departments. The gist of it is that because instruction in diagnosis from the individual departments is highly specialized it does not lend itself to welding clinical dentistry into the integrated pattern that it should be. It does not help the students to see the work of the various clinical departments in the proper perspective. Under decentralization of the diagnosis department, there is too much variation in procedure and instruction between various departments and in many instances much duplication of effort when a patient passes through more than one department.[7]

This interpretation of the expressed convictions has forced us to do self-analyses of our own individual departments in relation to our association with the department of oral diagnosis. When we also recognize the progress of research in the *preventive* or *control* means of restraining the breakdown of the dental mechanism, we must accept the fact that "diagnosis" must play an ever increasingly important role in the training of students for the practice of dentistry, and that a degree of centralization of the department of oral diagnosis is a necessity.

The relationship of an individual department, such as the department of crown and bridge, to *a decentralized* department of diagnosis is *general.*

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[7]Zukin, D. S., Burke, L. W., and Blevins, G. C.: "Teaching Oral Diagnosis to Dental Students," *The Journal of Dental Education*, 61-88; Dec., 1945.

"Teaching Oral Diagnosis to Dental Students," Conference Report, *The Journal of Dental Education*, 1-16; Oct., 1946.

It is general in its relationship in that it pre-supposes the training of the students to accomplish a good, preliminary examination.

It is general when the decentralized department of diagnosis rather loosely recommends a treatment plan, a 1, 2, 3, of patient routing.

The relationship of an individual department, such as the department of crown and bridge, to a *centralized* department of diagnosis is both general and specific.

The more highly centralized the department of oral diagnosis becomes, the more specific must be the relationship between the individual departments and the department of oral diagnosis. The *specific* diagnosis and treatment planning of a *truly* centralized department of oral diagnosis is indirectly responsible for the detailed construction, the functional and biological success of the treatment. The individual department must become as much a part of the diagnosis department as is possible under the existing circumstances.

Each dental school, as we so well know, has its individual problems: patient availability, size of classes, physical plant, student-teacher ratio, departmental autonomy, clinic income—available budget. Any one or combination of these factors controls the degree to which it is feasible to centralize the department of oral diagnosis and treatment planning.

I am sure we are all aware of the tendency for the instructor in the department of diagnosis, or the individual department, to make the necessary diagnosis and treatment plan for a patient. This tendency exists because it expedites the handling of greater numbers of patients and facilitates the efficient operation of individual departments. Thus, the student is for the most part an observer.

For this presentation, I have attempted to keep in mind the purpose behind these discussions. The primary purpose, I believe, is to accomplish a more correlated understanding of the problems and procedures of diagnosis and treatment planning *in the mind of each student.*

The student contacts several patients in the short time he is in dental school. He does some brief clinical restorative dentistry for the child, the teen-ager, and the adult. In the main, the purpose of this work is that of fulfilling a clinical requirement of an individual department for graduation. The student does not adequately relate these relatively short contacts with patients into an integrated pattern of diagnosing and treating a patient's dental needs, as if he were treating a patient from childhood through adulthood.

It is our primary aim to try to correlate our instruction in such a manner that the student will have a better conception of diagnosis and

treatment—as if he had observed the conditions and performed the multiplicity of operations necessary for a patient through an entire life span. Emphasis on this kind of understanding in the minds of the students is a necessity.

What is the relationship of the individualized department to a centralized department of diagnosis and treatment planning? Again I repeat that the more highly centralized the division of oral diagnosis becomes, the more specific must be the relationship between it and the departments.

What are some of the steps the individual department can take to accomplish this specificity of relationship of the oral diagnosis department?

The individual departments must know first hand the plan and procedure of the activities of the department of diagnosis, so that a similar pattern of careful observation and procedure will follow through for the student in all of his clinical associations.

The individual department must know what students receive by way of lectures from the department of oral diagnosis, even to taking part in a well integrated series of lectures as regards diagnosis and treatment planning.

The personnel of the oral diagnosis department must be well acquainted with the lecture content, problems, technics and procedures of the individual clinical departments.

Interdepartmental seminars are a necessity to correlate information about, and activities of, a centralized department of oral diagnosis with all other areas of the school.

It is necessary to have an adequate staff for a centralized department of oral diagnosis. I would recommend staffing with personnel representing the individual clinical departments for as many days of each week as is possible. An alternative might be a system of consultation for special cases, by appointment with the patients, students, and the departments concerned, preferably in the department of oral diagnosis. If this is not practical, it would be necessary to have a system of referring patients and students in diagnosis to the individual departments for consultation.

There should also be student seminars on case histories, presented by members of the oral diagnosis department. These should include the case histories and proposed plan of treatment, and also the results of treatment presented by the instructors and students of the restorative departments responsible for the clinical work.

Credit towards the fulfillment of the requirements for graduation

in a *restorative dentistry department* should be given for unusual diagnostic activities by the student in the individual department.

As each individual department blends itself into a centralized department of oral diagnosis, it will undoubtedly add a part of its own specialized diagnostic prerequisites to the responsibilities of the diagnosis department. An example of such an activity from the department of crown and bridge delegated to the department of oral diagnosis would be the ordering of study casts of all potential bridge cases. In many instances it would be necessary to transfer the study casts to an adjustable articulator so that occlusion, distribution of stresses, arch form, vertical dimensions of edentulous areas, elongation, rotation, tipping and size and shape of the teeth might be more carefully analyzed as factors in prescribing the initial treatment planning in relation to the best possible treatment in all departments. In varying degrees, oral surgery, periodontia, and operative dentistry treatment usually precedes the fabrication of a bridge. Yet I would guess that in most instances study casts are not available as a diagnostic aid to *treatment planning* and treatment until the patient has reached the department of crown and bridge. In my opinion, study casts at the time of initial diagnosis and treatment planning would greatly assist in a better initial overall diagnosis and treatment plan and would certainly be an aid to the student and to the several individual departments, besides that of crown and bridge, in rendering treatment.

Oral diagnosis and treatment planning as a whole is in reality the core of the coordinated instruction a student receives through relationship with the many individual departments comprising a school of dentistry, plus the correlation and application of the predental and basic science course materials with the clinical activities.

Centralization of the department of oral diagnosis or integrated teaching will be successful if the chief requirements are fulfilled. These are: wholehearted enthusiasm on the part of the faculty to participate in their program; willingness to ignor small differences of opinion in the interest of harmony and cooperation, and genuine interest in teaching and in the problems of dentistry.

Just as the departments of pedodontics were emphasized by recognizing the need, so can we anticipate the development of the departments of oral diagnosis, which will contribute to a greater centralization of this department.

III. OPERATIVE DENTISTRY

Plastics in the Field of Operative Dentistry: Teaching and Present Status

HERBERT D. COY., D.D.S.,[8] *Richmond*

Acrylic resin as a filling material now holds the spotlight on the stage of operative dentistry.

Since this section is considered to be the "bread and butter" of the profession, it is necessary that we keep up with the research now being done on the materials, which we are teaching the students to use in the branch of dentistry which comprises such a large part of our total contribution to the public welfare.

Acrylic resin has been used in denture prosthesis for many years. Just preceding and during World War II German scientists began experimenting with it for use as a substitute for metals, as a restorative material, which had become scarce in their country during that time.

In the beginning its use as a direct filling material was not very satisfactory due to the great difficulty in applying heat to induce polymerization. Later a tertiary amine was added to the monomer, which reacted with the benzol peroxide in the polymer, thus creating its own heat, so the material became known as auto-polymerizing resin.

Resin as a filling material was introduced into the United States in 1947, following the publication of the Blumenthal report. It came into general use in 1949.

Esthetics and appearance in any of the easily visible portions of the mouth are so important in our present day civilization that many patients object to restorations that display the sight of gold. This has caused us to be eager to take up the use of a material of lesser restorative value than gold foil which is conceded to be the best of all restorative materials, since we wish to satisfy the demands of the patient.

Physical Properties

The shrinkage of this material is about 7 per cent by volume, which is one of its greatest shortcomings. This figure has been verified by research associates at the National Bureau of Standards.

If the pressure technic is used, no doubt some of this shrinkage takes place before it is placed in the cavity. The shrinkage is not uniform and will manifest itself to a greater degree where the pressure is the

[8]Medical College of Virginia, School of Dentistry.

least. It is, therefore, important to maintain the pressure with constant force until the material has reached its initial set.

Moisture introduced during the mixing or during the insertion will greatly accelerate the hardening time and lighten the shade. The use of the rubber dam will help to minimize this problem.

In the dental clinic, Medical College of Virginia, School of Dentistry, we have practically discarded the pressure technic because it is time consuming and in most cases difficult to use and also because of the inclination on the part of the students and the profession in general to fail to understand the importance of maintaining constant pressure for the necessary length of time.

We have adopted the Nealon or compensating technic as the one of choice. This technic partially compensates for the shrinkage because each succeeding application fills in some of the shrinkage of the preceding one. The overall shrinkage occurring when this method is used has not yet been measured but it is thought to be less than with the pressure technic.

When using this technic, care should be exercised in dipping the brush into the monomer after each application because the introduction of even a minute portion of polymer may activate the monomer and thus neutralize any further heat reaction between the two, thus causing a very slow reaction.

It is important, too, that evaporation of monomer from the mixture be minimized after the cavity is filled by covering the restoration with tin foil or similar material. To leave it uncovered is to allow free evaporation of monomer from the filling which causes surface porosity and a filling that will more readily discolor.

In addition to the comparatively large shrinkage, the resins are very soft by comparison with any type of metallic restorations. Since resins are twice as soft as pure gold, which medium, all authorities agree, is too soft to use for an inlay, where any stress of mastication is involved, it would seem that by the same token resins are not indicated in any stress bearing area.

Then, too, the thermal dimensional change of the resins is about eight times greater than tooth structure, which may prove to be a contraindication for their use. However, the effect of this difference in expansion and contraction in the various temperatures can only be determined by continuous clinical observation over a long period of time. There are those who contend that hot or cold liquids taken into the mouth do not contact the anterior teeth to any appreciable degree,

nor for a sufficient length of time to cause extreme thermal reactions.

Fillings in extracted teeth subjected to sudden immersion in ice water do show a definite percolation when subjected to slight pressure and observed under a microscope. This percolation has also been noted under amalgam restorations but to a lesser degree. The reason this seepage of fluids in the latter instance is thought not to be damaging is that amalgam is undoubtedly bacteria-static to a degree that resists the growth of bacteria. This quality has not yet been demonstrated in the resins.

When compared to silicious cements, we find that the resins have the advantage of being practically insoluble in the fluids of the mouth. They are also more esthetic in that the colors are more stable and it is easier to match the shades of the natural teeth. In fact, if properly inserted the esthetics are almost perfect.

The one great advantage that silicious cements has over the resins, as a permanent restoration, is that they also are bacteria-static and there is little evidence of recurrence of caries under them. This is supposedly due to the formation of a fluoride, which is discharged as it is dissolved from the silicate by the fluids of the mouth.

Clinical Observations

In the Medical College of Virginia, School of Dentistry, where we have kept a constant check on direct resinous fillings for nearly three years, we have found that when the pressure technic is used there is great difficulty in getting the proper pressure and a tendency to remove the pressure before the initial polymerization had terminated. The failure to apply constant pressure for a sufficient length of time will permit the shrinkage to take place along the cavity margins, which will soon be apparent by the formation of brown stains along those margins. This is because the amines used in the monomer to create the reaction with the polymer is an oxidizing agent and for that reason it shows up more in areas of porosity. Brown spots in the body of the filling are caused for the same reason and can be avoided by proper mixing and the correct application of pressure. The oxide stain is not so apparent when the brush technic is used.

Although the coefficient of expansion of the resins is very great compared to the tooth structure, the careful removal of many fillings that have been in service for a year or more has failed to reveal enough evidence of a detrimental nature to contra-indicate their use. Only clinical observation over a much longer period of time will give us the answer to this problem and the final evaluation of the resins as a restorative material.

Pulp Reaction

A joint meeting of the Council on Dental Research and the Council on Dental Therapeutics of the American Dental Association was held in Chicago in April, 1950. Many of the research workers concerned with this problem were present and it was conceded that although there is a pulp reaction it is no greater than that from oxyphosphate of zinc cement and is of a reversible nature. This would indicate that no cavity liner is necessary in their use.

The teaching of operative dentistry involves, to a great extent, knowledge of the chemical and physical properties of dental materials. This is particularly so in the use of the direct resin filling materials which are at the present time in the developmental stage. We must, therefore, depend largely upon the various dental research laboratories and their reports in the dental literature as a guide in the future.

As teachers we must urge the student to observe and reflect upon his use of these materials. This involves the keeping of records and careful clinical observation of restorations using the plastic filling materials. This should include inspection of the restoration under magnification. In such observations and studies, controls with silicate cement should be used since there have been approximately 50 years of experience with it.

Operative teachers frequently do not keep abreast of modern developments. They neither attend lectures nor make any effort to improve their knowledge. They conduct little or no research even of a simple clinical type. In departments where this situation exists, students are not being taught the proper concept of operative dentistry exemplified by G. V. Black when he said, "The dentist has no right to be other than a continuous student."

While I have stressed the importance of research and observation, these should be regarded as an adjunct to manual dexterity and operative skill. They are not to be considered as a substitute.

Every operative department should include a comprehensive research program but this should not cause us to lose sight of the fact that our objective in operative dentistry is to restore tooth structure lost because of the ravages of caries and to eliminate disease by restoring normal tooth form and contact. This requires a high degree of skill which can only be acquired by constant study and practice in both the laboratory and at the chair. The teaching of operative dentistry should be not only by lectures but by actual chair side demonstration. This means the teacher should be a combination of lecturer, research worker, and skillful

clinical operator, to give the student the true inspiration he needs in order to best serve humanity in his chosen profession. We can all do this, not only by reading it from books but by availing ourselves of every opportunity to learn by actual experience and doing.

Conclusion

The resins as a filling material are still in the developmental stage and their use should be taught and advocated with moderation and restraint until more knowledge is available.

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Discussion

E. W. SKINNER, Ph.D., *Chicago*

Some years ago, I was assigned this same topic for a paper concerned with the use of acrylic resin for inlays in operative dentistry. At that time, I was somewhat doubtful as to the probable efficiency of acrylic restoration in the form of inlays and jacket crowns.

Today the situation has changed. The present acrylic resins can be processed in position in the cavity preparation instead of relying upon the accuracy of a mold, as was formerly the case. The present operation is direct instead of indirect, as formerly, and the result is a decided improvement. However, I am in complete agreement with Dr. Coy that we have a long way to go before an ideal situation is attained. Certainly we should maintain a conservative viewpoint toward teaching the use of such materials which are definitely inferior to other filling materials in many respects and concerning which our fundamental knowledge is so lacking.

It is true that the direct acrylic filling materials shrink upon curing, but there is considerable evidence which indicates that the shinkage can be directed toward regions which, it is hoped, are unimportant. For example,

in the pressure technic, one of the reasons for maintaining the pressure on the matrix until the material has hardened is to hold in position the excess which pours over the margin of the cavity preparation when the matrix is placed. If this excess, or "flash," is held tightly in position, it is expected that it will hold the resin against the marginal wall so that the contraction will take place in other parts of the filling rather than at the margins. Such a theory predicts that the filling will resemble very much a tight cork in a bottle—it fits at its top but not at the bottom. It should be noted, therefore, that the pressure produced by the matrix does not prevent the shrinkage, it merely controls it.

Although the Nealon technic offers many advantages over the pressure technic, it is doubtful that a clinically significant difference in volume shrinkage occurs with the Nealon technic as compared with the pressure technic. Although the actual shrinkage which occurs with the Nealon technic has never been measured, visual observation in connection with our own research bears out this conclusion.

Certainly such a conclusion follows on theoretical grounds. For example, according to Nealon, the average time required to fill the cavity preparation with the brush technic is approximately 5 to 10 minutes, depending on the size of the cavity. It has been shown that the time at which the major portion of the polymerization is finished varies from approximately 5 to 12 minutes, depending upon the particular resinous material used. It is therefore possible that, in very large cavity preparations, the first portions placed in the cavity preparation may have polymerized with the greater part of the volume, shrinkage having taken place before the last portions of the material are inserted. The upper layers of material will not, however, be fully polymerized when the operation is finished and definite uncontrolled shrinkage will occur in this region.

Unfortunately, most of the cavity preparations where plastic fillings are indicated in operative dentistry must be classified as "small" on the basis of the bulks of the resin used, and the resulting exothermic heat from the polymerization reaction will be small. It is a well known fact that the greater the amount of the exothermic heat, the more rapid and complete will be the polymerization. Since the rate of volume shrinkage is dependent on the rate of polymerization, it follows that in the case of small cavity preparations which are filled in 5 minutes, according to Nealon, the polymerization may not progress very far until after the preparation is filled. In this case a reduction in effective shrinkage probably does not take place.

Another possible disadvantage of the Nealon technic is that more monomer is required for its use than for the pressure technic. Although it is possible that the excessive amount of monomer may not affect the shrinkage, it is possible that any subsequent discoloration of the resin might be enhanced. The monomer contains the chemically unstable activator which may break down with time to produce a discoloration. Probably considerable of the monomer evaporates during the operation with the Nealon technic and the activator is left as a residue in excess of the amount present in the pressure technic.

It should be understood that the possible disadvantages of the Nealon technic have been enumerated only so that they can be recognized. Certainly the advantages of the Nealon technic are so numerous and so important that they can be considered to more than compensate for its disadvantages, particularly when the latter are compared with the disadvantages of the pressure technic. We are completely in agreement with Dr. Coy in the superiority of the Nealon technic over other known methods for placing the resin in the cavity preparation.

We have incorporated the theory and technic for the use of these resins for both denture bases and operative restorations in our present freshman course in dental materials. We do this with the expectation that improvements in the materials will materialize before the present freshman class graduates. We also advocate that they be used where they are indicated in the operative clinic to replace, to a limited extent, the silicate cement restoration, provided that the students are properly cautioned in regard to their use, and that close supervision is given.

LIBRARY CORNER

JOSEPHINE P. HUNT,[1] *Chicago*

At the meeting of the Medical Library Association held at Lake Placid in June, a fine group of dental librarians was present. Among the papers read at the dental librarians' session was one by Mrs. Helen Kovacs, periodicals librarian of the University of Alabama, School of Dentistry, on the History of Dental Journals in Foreign Languages. This paper represented a tremendous amount of work and offered a great deal of information not readily obtainable elsewhere. Though, according to the author, the paper omits some information which should be included and undoubtedly contains errors, we feel that it is a valuable contribution to the literature on this subject and hope it will appear in print before long. There was also an instructive presentation on the library use of visual aids by Margaret Gayley Palmer, Librarian of the University of Pennsylvania, School of Dentistry.

Several of the librarians attending the Lake Placid meeting expressed a desire to have an American Dental Association meeting for dental librarians in 1953 similar to those held in 1949 and 1951. Accordingly, tentative arrangements are underway and it is probable that a meeting will be held in Chicago in June or July. It will be appreciated if librarians who have questions they would like to have discussed or who have found a satisfactory method of handling certain troublesome problems, would get in touch with Dr. Donald Washburn, Director of the Bureau of Library and Indexing Service. Your suggestions regarding topics for discussion will be most helpful in planning a worthwhile meeting. Reprints of the papers presented at the 1951 dental librarians' conference are available to those interested.

School or association dental libraries which do not have a set of the index covering the years 1876-1941 (15 volumes) may still obtain these without charge by paying the transportation costs. The weight of these volumes is approximately fifty pounds. About one hundred and fifty sets of indexes have been distributed in the last few years to help in the development and rehabilitation of libraries. The five volumes from 1942 to date can be obtained only through purchase. The 1942-1944 volume is out of print and cannot be supplied at this time.

The American Dental Association library has a generous supply of duplicates of the Transactions of the Illinois State Dental Society for the years 1921, 1922, 1923 and 1926 which also may be had for the asking. A few copies of other years are available also. These early transactions contain the papers read at the annual meetings of the Illinois State Dental Society. There are also a few copies of the Asociacion Americana de Ortodoncistas for 1944. These are in Spanish.

A large number of books by individual authors (not the latest editions in most cases) are also available. These are mostly on prosthetic dentistry, oral surgery and operative dentistry. Among the books on operative dentistry are copies of the 7th and 8th editions of Black's "Operative Dentistry." Most of the older dental school libraries in the United States would have these books but there are some volumes which undoubtedly would be useful to new libraries here and more particularly to those dental schools outside of the United States which are trying to build up or restore their damaged collections.

Many dental school catalogs (mostly old but some fairly current) may also be had upon request. Arrangements to pay transportation charges for any of these items must be made by the recipients.

[1]Associate Librarian, American Dental Association.

COLLEGE NEWS

Edited by SIDNEY EPSTEIN, D.D.S., *San Francisco*

Creighton University:

APPOINTMENTS

Ralph S. Albertson, D.D.S., professor and head of prosthetic dentistry department.

Robert V. Vining, D.D.S., instructor, prosthetic dentistry.

Maurice B. Griffin, D.D.S., assistant, dental anatomy.

Orval P. Nesselbush, D.D.S., assistant, operative dentistry.

Georgetown University:

ANNOUNCEMENTS

Degree of Doctor of Science conferred on Dr. Sterling V. Mead, class of '29.

Clifton K. Saunders, D.D.S., recipient of School's Award of Merit for 1952.

Medical College of Virginia:

APPOINTMENTS

Dr. Herbert W. Park, professor, physical medicine and rehabilitation and director, Baruch Center.

Dr. Henry G. Kupfer, professor, clinical pathology.

Dr. Miles E. Hench, assistant professor, clinical bacteriology.

Temple University:

ANNOUNCEMENT

Graduate courses are announced by this school, information concerning which may be had from the school.

APPOINTMENTS

John Engler, D.D.S., instructor, radiodontia.

James Naplacic, D.D.S., instructor, Endodontia.

John Motsko, D.D.S., instructor, periodontia.

Harry Hallman, D.D.S., instructor, operative dentistry.

Irvin Friedman, D.D.S., instructor, oral diagnosis.

John McKenna, D.D.S., instructor, pedodontia.

Clifford Heistand, D.D.S., instructor, pedodontia (part time).

PROMOTIONS

George Weisenberger, D.D.S., crown and bridge prosthesis (full time).

John D'Allesandro, D.D.S., and Edward Reichert, D.D.S., oral diagnosis (half time).

Robert G. Savage, D.D.S., and H. E. Flight, D.D.S., assistants, full and partial denture prosthesis.

Stanley R. Wieder, D.D.S., assistant in histology.

Dr. Richard Snodgrass, associate professor, general anatomy.

University of Illinois:

ANNOUNCEMENT

This school announces graduate and postgraduate courses in subjects from basic sciences to the telephone extension course.

PROMOTIONS

Dr. Surindar N. Bhaskar, from instructor to professor, oral pathology.

Dr. Verda E. James, assistant professor, histology.

Marguerite H. Donovan, from chief technician to assistant, dental radiology.

University of Texas:

ANNOUNCEMENT

Announcement is made of the resignation of the dean, Dr. Frederick C. Elliott, and his appointment as executive director of the Texas Medical Center, a comparatively new health project for the benefit of the people of Texas.

BOOK ANNOUNCEMENTS

Pharmacology in Clinical Practice. This is a book of 839 pages, with 152 figures, although designed for undergraduate teaching, yet it becomes at once a valuable reference book for dentists and physicians. The author, Harry Beckman, M.D., is director, department of pharmacology, Marquette University, School of Medicine and Dentistry; consulting physician, Milwaukee County General Hospital and Columbia Milwaukee. Published by W. B. Saunders Company, Philadelphia, 1952. Price, $12.50.

Special Dental Anatomy and Physiology and Dental Histology. This is the 8th edition of volume 1 of a two-volume set, by the author, T. W. Widdowson, department of dental anatomy, Kings College Hospital. The book consists of 481 pages, with an index, excellently illustrated, with some in color. There is also a chapter on Histological Technic. Published by Staples Press, Ltd., 70 E. 45th Street, New York, N. Y., 1952. Price, $10.00.

Design of the Natural Dentition. This represents "An investigation into the physical attributes and mechanical principles of the Dental Function." It consists of 126 pages, with an index and is well illustrated. The author, H. H. Boyle, D.D.S., and L.D.S. (R.F.P.S.) Glas. R.C.S., Edin., is consultant to the Welsh Regional Hospital. Published by Staples Press, 70 45th Street, New York, N. Y. Price, $4.25.

Intravenous Anesthesia in Dentistry. This book consists of 152 pages, with an index. It should be valuable to anyone using anesthetic agents, with particular reference to the newer ones now available. The author, S. L. Drummond-Jackson, completed this book for the F.D.I. Congress, held in July, 1952. Published by Staples Press, 70 45th Street, New York, N. Y. Price, $5.00.

Dental Anesthesia (A manual of). This is the title of a new book by W. Harry Archer, B.S., M.A., D.D.S., professor of oral surgery and anesthesia, School of Dentistry, University of Pittsburgh. It consists of 192 pages with an index, and is well illustrated. The author is a well known wit in the profession and his book should serve as a valuable adjunct to the oral surgeon. This book might help solve an apparently growing problem, namely, where does oral surgery stop and general surgery begin?

The Growth and Development of the Negro in Dentistry in the United States. This is the title of a new book by Clifton O. Dummett, D.D.S., F.A.P.H.A., chief, dental service, Veterans' Administration Hospital, Tuskegee, Alabama; formerly Dean and Director Dental Education, Meharry Medical College, Nashville, Tennessee.

It is a record of the development and progress of the Negro in dentistry, including an evaluation of past accomplishments and pointing the way to successful completion of the tasks of the future. Eight scientists in the fields of dentistry, medicine, nursing, public health, research, sociology and the biological sciences have contributed to this book which presents in a single compact volume the accomplishments which Negroes have made in general practice, public health, dental education and research, specialization and administration. Published by National Dental Association, 1555 Roosevelt Rd., Chicago, Illinois. Price, $5.00.

General Information

Address all correspondence relating to manuscripts and copy for publication in this JOURNAL to the editor, John E. Gurley, University of California, College of Dentistry, The Medical Center, San Francisco 22, California.

Address correspondence concerning sale of the JOURNAL and advertising space to the business manager, Charles W. Craig, University of California, The Medical Center, San Francisco 22, California.

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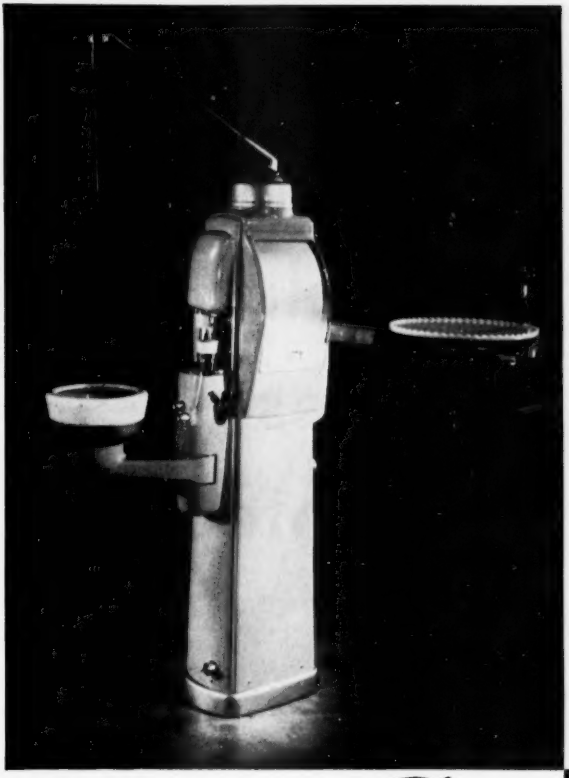

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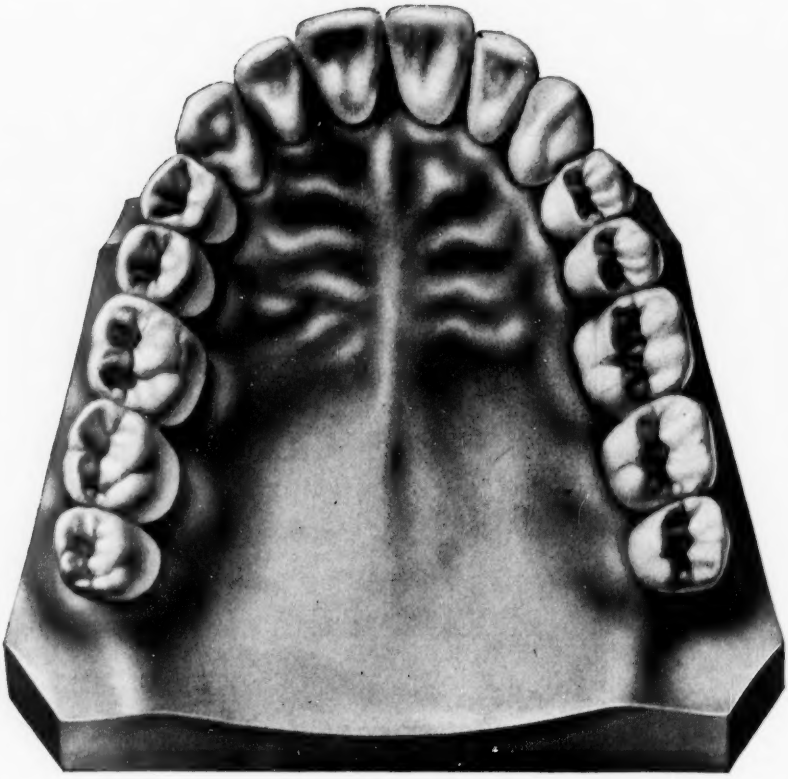

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